Overview of VTO Technology Integration Activities

June 9, 2015

Linda Bluestein - Clean Cities /Deployment

Connie Bezanson - Vehicle Education

Technology Integration Overview

Activities

- VT Deployment (Clean Cities) – A voluntary, locally based government/ industry partnership initiative
- Legislative and Rulemaking
- Advanced Vehicle Competitions
- Graduate Automotive Technology Education

Mission and Portfolio of Technologies

Clean Cities Mission

Advance the energy, economic, and environmental security of the United States by promoting and supporting local decisions that results in the reduction of petroleum use in the transportation sector.

Alternative Fuels

Electric Vehicles
Biodiesel
Ethanol
Hydrogen
Propane
Natural Gas

Idle Reduction

Heavy-duty trucks
School & transit buses
Light-duty vehicles

Fuel Economy

More fuel efficient vehicles, adopting smarter driving and vehicle purchasing habits

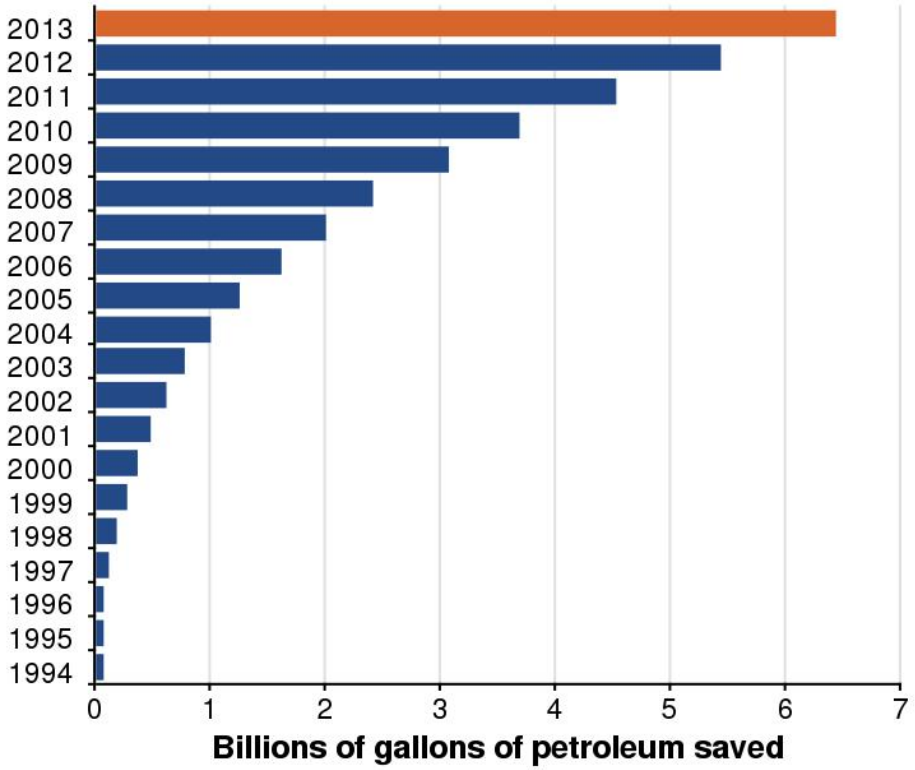
Hybrids

Light- and heavy-duty
Electric hybrids
Plug-In hybrids
Hydraulic hybrids

Goals and Objectives

Clean Cities Objectives:

1. Forming Local Community Partnerships
2. Consumer Information, Outreach, and Education
3. Technical and Problem Solving Assistance
4. Competitively-Awarded Financial Assistance

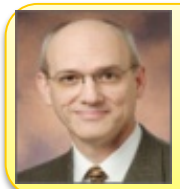


Nearly 6.5 Billion Gallons of Petroleum Reduction since 1993

- Over 592,000 AFVs reported on the road in CC territories
- Over 19,000 alternative fueling and charging stations (CC influenced >70%)
- Long term goal of 2.5B gal/year by 2020

Program Management and Budget

DOE Headquarters

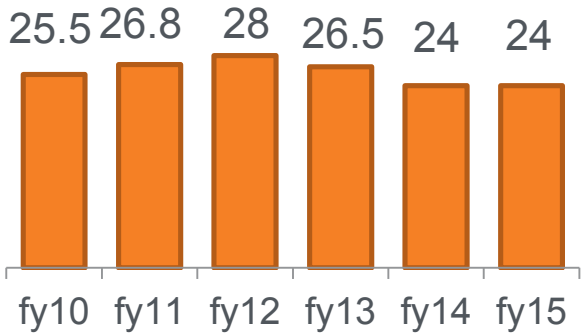


Dennis Smith
Director

Linda Bluestein
Co-Director

Shannon Shea
Communications Manager

Mark Smith
National Partners Manager



Budget History ($M)

ORNL, NREL, ANL

National Energy Technology Laboratory – DOE Regional Managers

Neil Kirschner
South Central

Trev Hall
Southeast

Dave Kirschner
North Central

Darren Stevenson
Mid-Atlantic

Erin Russell-Story
Northeast

Brett Aristegui
California/Northwest

Deployment Challenges and Rationale

Deployment efforts accelerate market transformation by increasing public awareness & consumer acceptance/adoption of new vehicle technologies that are being developed through the Vehicle Technologies Office (VTO) R&D activities.

Deployment programs are essential when the success of new technologies depends on consumers changing their driving and purchasing habits.

Primary Focus – Achieve Petroleum Reduction …
by implementing next-steps when R&D is completed

Roughly 10% of VTO base budget supports Deployment (Technology Introduction) efforts

VT Deployment Strategy (leveraging people & resources)

Implement national policies and initiatives by facilitating change on a Local and National basis

Local

Develop a franchise model (designate CC coalitions) so that approach and message are consistent everywhere, but with attention to local market conditions and priorities (provide strategic direction and comprehensive training to franchisees)

Clean Cities
U.S. Department of Energy

National

Provide a national unbiased source of info

Provide tools, experts to address barriers and solve problems

Develop corporate partnerships with industry and national fleets

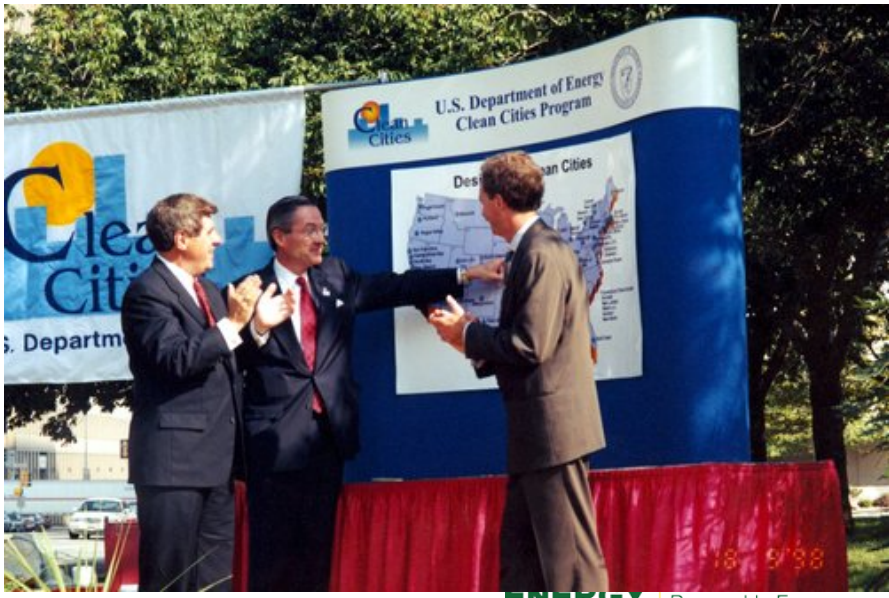
Increase awareness and publicize success through mass media and outreach

Provide financial assistance to jump start markets and incentivize private investment

How Coalitions Achieve Designation

Clean Cities Model

- **Step 1:** Form a coalition and hold stakeholder meetings
- **Step 2:** Appoint a coordinator
- **Step 3:** Engage community leaders & establish stakeholder commitments (public & private sector)
- **Step 4:** Develop a program plan or (roadmap)
- **Step 5:** With DOE approval, officially launch a coalition
- **Step 6:** Implement the program plan, institute local policies, manage projects, and develop infrastructure



And Once They Are Officially Designated...

- *Coordination with key community and business leaders*
- *Identification of potential fleet and funding partners*
- *Facilitating Infrastructure development projects*
- *Tracking progress*
- *Coalition technical training and strategy implementation*
- *~100 coalitions serving 78% of the U.S. population*

(photo courtesy of White House)

(1) Forming Local Community Partnerships

~100 coalitions serving 80% of the U.S. population

Thousands of stakeholders from businesses, city/state governments, transportation industry, community based organizations, utilities and fuel providers

(1) Leveraging Partnerships: Top Per-Capita Petroleum Reduction

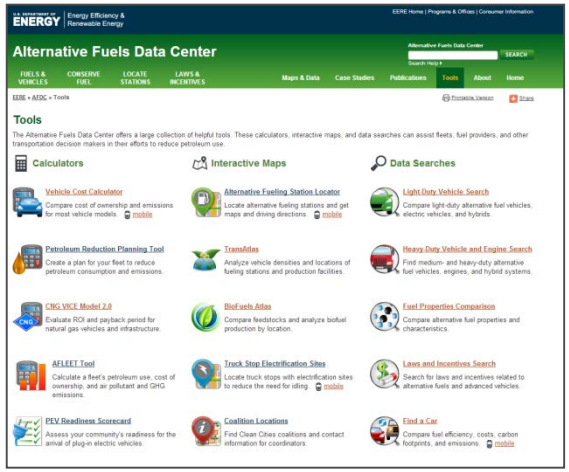
Rank	State	Coalition	GGEs Reduced	Population	Per Capita Reduction
1	CA	Coachella Valley	2,951,853	82,920	35.6
2	CA	Western Riverside County	8,399,294	243,794	34.5
3	CA	San Francisco	22,364,746	837,442	26.7
4	WY	Yellowstone-Teton	3,576,888	145,217	24.6
5	AZ	Valley of the Sun (Phoenix)	60,765,567	4,584,438	13.3
6	OR	Rogue Valley	2,437,645	208,545	11.7
7	MI	Ann Arbor	2,983,217	354,240	8.4
8	CA	Southern California	37,955,448	5,164,964	7.3
9	IN	South Shore	10,588,552	1,670,059	6.3
10	NY	Greater Long Island	15,479,149	2,851,884	5.4

Richard Cromwell and Georgia Seivright team together to form a powerful financial leveraging coalition. In the early years of the coalition, a series of public natural gas stations were developed. Concurrently, the coalition helped local fleets find grant funds to assist with vehicle procurement. Through this team's leadership, hydrogen fueling infrastructure and vehicles were also implemented in the Coachella Valley.

(2) Consumer Information, Outreach, and Education

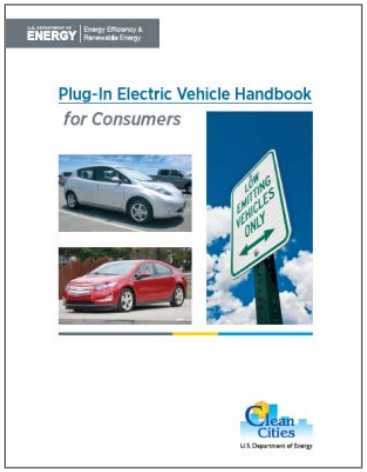
- Non-biased source of VT data and information
- Fuel Economy Guide (FE.gov), Alt-Fuel Data Center (AFDC)
- On-line tools and cost calculators, other web resources
- Fact Sheets, publications, handbooks, success stories
- Technical Response Service and Hotline
- Public workshops, webinars, industry technical conferences

Tech Bulletins



Online Tools

Technical Response Service



Publications

(2) Tools, Publications, Data and Mobile Apps

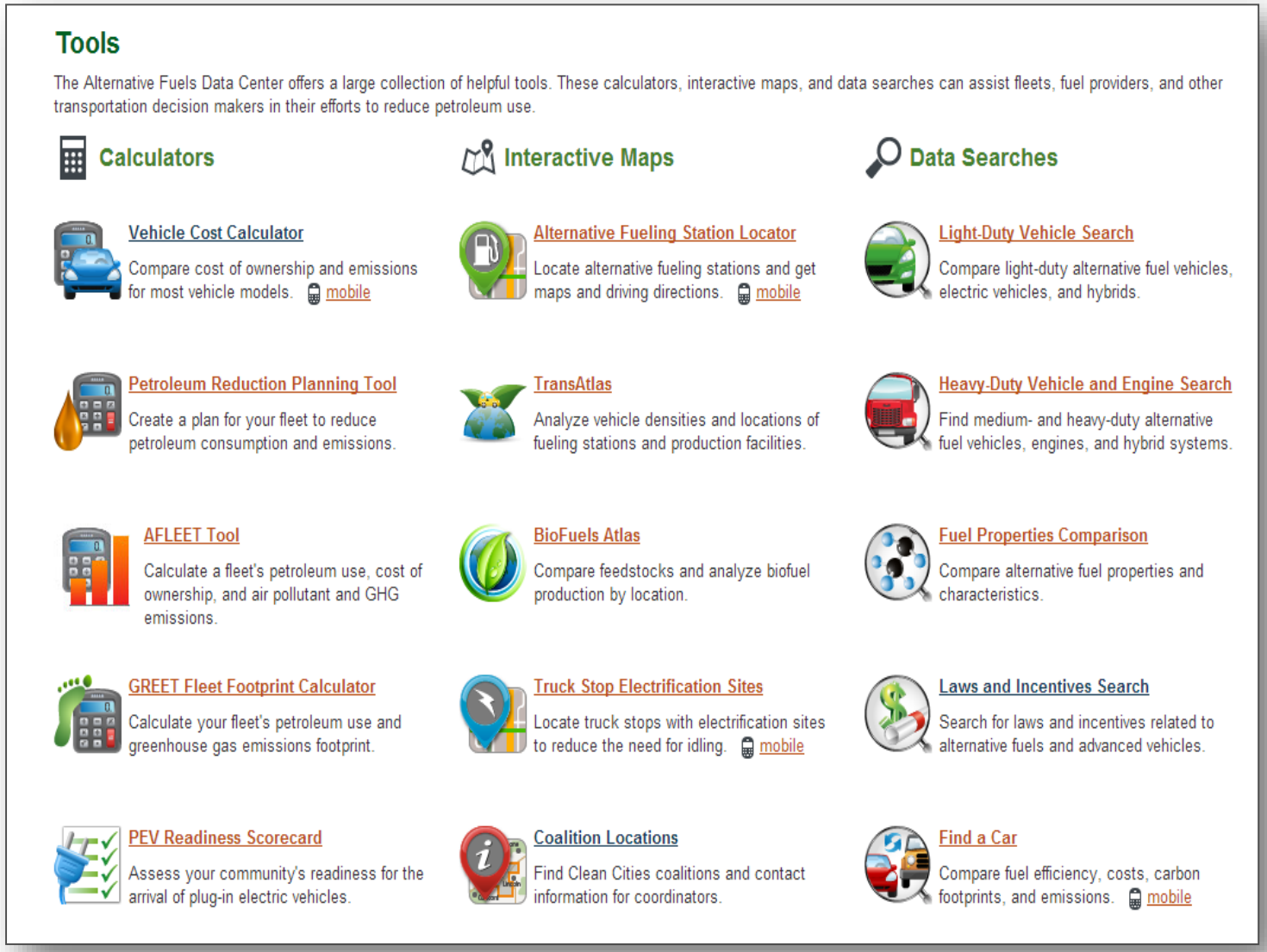
FuelEconomy.gov

Enables consumers to find the fuel-efficient vehicle that meets their needs, as well as save gas and money with their current vehicles

Alternative Fuels Data Center

Helps fleets choose the right alternative fuel or other petroleum reduction approach for them, with almost 100 case studies and 14 interactive tools

(2) More Resources



Tools

The Alternative Fuels Data Center offers a large collection of helpful tools. These calculators, interactive maps, and data searches can assist fleets, fuel providers, and other transportation decision makers in their efforts to reduce petroleum use.

Calculators

Vehicle Cost Calculator
Compare cost of ownership and emissions for most vehicle models. mobile

Petroleum Reduction Planning Tool
Create a plan for your fleet to reduce petroleum consumption and emissions.

AFLEET Tool
Calculate a fleet's petroleum use, cost of ownership, and air pollutant and GHG emissions.

GREET Fleet Footprint Calculator
Calculate your fleet's petroleum use and greenhouse gas emissions footprint.

PEV Readiness Scorecard
Assess your community's readiness for the arrival of plug-in electric vehicles.

Interactive Maps

Alternative Fueling Station Locator
Locate alternative fueling stations and get maps and driving directions. mobile

TransAtlas
Analyze vehicle densities and locations of fueling stations and production facilities.

BioFuels Atlas
Compare feedstocks and analyze biofuel production by location.

Truck Stop Electrification Sites
Locate truck stops with electrification sites to reduce the need for idling. mobile

Coalition Locations
Find Clean Cities coalitions and contact information for coordinators.

Data Searches

Light-Duty Vehicle Search
Compare light-duty alternative fuel vehicles, electric vehicles, and hybrids.

Heavy-Duty Vehicle and Engine Search
Find medium- and heavy-duty alternative fuel vehicles, engines, and hybrid systems.

Fuel Properties Comparison
Compare alternative fuel properties and characteristics.

Laws and Incentives Search
Search for laws and incentives related to alternative fuels and advanced vehicles.

Find a Car
Compare fuel efficiency, costs, carbon footprints, and emissions. mobile

www.afdc.energy.gov/tools

(3) Technical and Problem Solving Assistance

- Capture lessons learned and develop best practices
- Technical Forums and User Groups
- Address unforeseen permitting and safety issues
- Identify chronic vehicle or infrastructure field problems
- Incident investigations (learn from failures)

Clean Cities
U.S. Department of Energy

Model EVSE Permit

Application for Installation of Electric Vehicle Charging Equipment

NOTICE: The system must be installed in compliance with the National Electric Code® NFPA 70, Article 625 Electric Vehicle Charging System or applicable electrical code currently adopted and enforced within the jurisdiction of installation. All associated work with circuits, electrical service and meters shall be completed in compliance with NFPA 70, national electric code, or applicable electrical code currently adopted and enforced within the jurisdiction of installation.

Section 1: Permit Applicant Information

Name:			
Installation Street Address (P.O. box not acceptable):	Contact Person:		Phone Number: ( ) -
City:	County:	State:	ZIP Code:
Owner Name:	Street Address:		Phone Number: ( ) -
City:	State:		ZIP Code:
Submitter's Name/Company	Street Address:		Phone Number: ( ) -
City:	State:		ZIP Code:
General description of equipment to be installed:			

Section 2: Permit Code Information

Requirements for wiring a charging station are taken directly out of the 2011 edition of the National Electrical Code® (NEC) NFPA 70, Article 625 Electric Vehicle Charging System. This article does not provide all of the information necessary for the installation of electric vehicle charging equipment. Please refer to the current edition of the electrical code adopted by the local jurisdiction for additional installation requirements. Reference to the 2011 NEC may be made at www.nfpa.org/70.

NEC® Chapter or Article	DESCRIPTION
Chapter 2 and 3	**Branch Circuit** A new electrical box added on a branch circuit shall comply with NFPA 70 National Electrical Code® Chapter 2 Wiring and Protection and Chapter 3 Wiring Methods and Materials and all administrative requirements of the NEC or the electrical code in effect in the jurisdiction
625.4	**VOLTAGES** Unless other Voltages are specified, the nominal ac system voltages of 120, 120/240, 208Y/120, 240, 480Y/277, 480, 600Y/347, and 600 Volts shall be used to supply equipment
625.5	**LISTED OR LABELED** All electrical materials, devices, fittings, and associated equipment shall be listed or labeled.

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

(4) Competitively-Awarded Financial Assistance:

Encourages private sector match and long-term investment

Clean Cities
U.S. Department of Energy

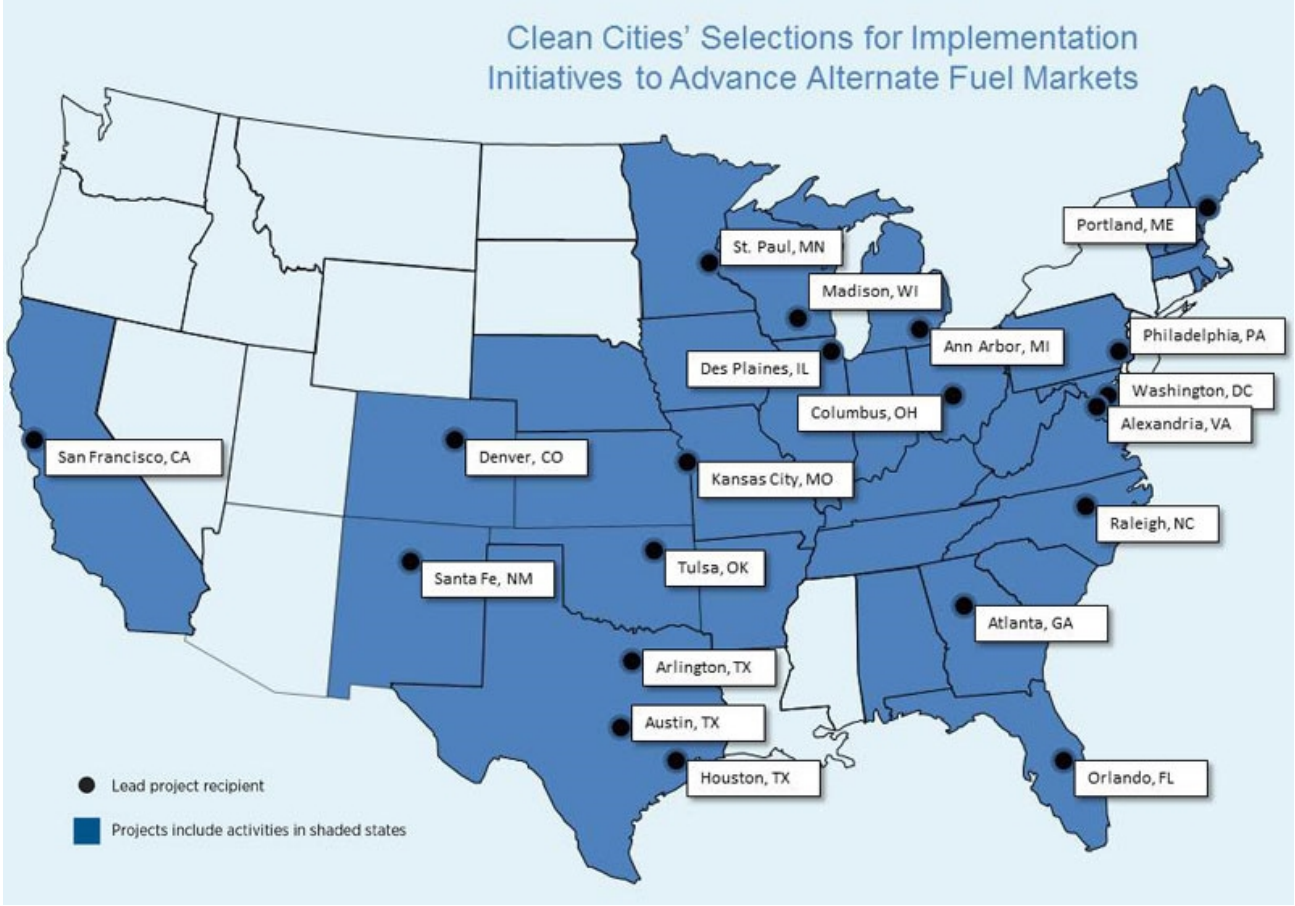
Alternative Fuel Market Project Awards ($11.1M) - 20 projects across 32 states and DC

Timeline:

- Awarded in 2013
- Reviewed in 2014
- Wrapping up in 2015

Community based initiatives that

- Address barriers
- Implement policies
- Streamline deployment of AFVs



U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

(4) Competitively-Awarded Financial Assistance:

Encourages private sector match and long-term investment

2015 Awards – ($6M) 11 Clean Cities Alternative Fuel Vehicle deployment projects. These projects will:

- Improve potential buyers' experiences with alternative fuel and plug-in electric vehicles
- Support training for first responders, public safety officials, and critical service providers
- Integrate alternative fuels into emergency response and preparedness operations

Future Directions – Request for Information closed March 13, 2015, and received 14 responses. Potential FY15 FOA targeting Alternative Fuel and Advanced Vehicle Procurement Aggregating Initiatives.

If vehicle fleets or consumers could purchase vehicles in larger quantities, or participate in aggregate purchasing initiatives, manufacturers and consumers could benefit from assured sales, as well as from reduced vehicle costs and lower resulting prices.

Clean Cities 2014 Notable Accomplishments

- 1 Billion Gallons Saved Annually – Clean Cities hit a milestone by reducing petroleum consumption by one billion gallons in a single year
- FuelEconomy.gov provides 31 years of vehicle data, has surpassed 350M users, and provides expanded support for mobile devices
- National Clean Fleet Partners has grown to include 26 large companies.
  - UPS will build 15 new CNG fueling stations to support the purchase and deployment of 1,400 new CNG vehicles over the next year
  - Coca-Cola converted 39 vans to hybrid electric operation using the XL3 system from XL Hybrids
  - Waste Management operates 24 CNG trucks in Chino, CA, and opened a new publicly-accessible CNG fueling station there in March 2015
- EVSE Station Locator has over 200,000 users, contains over 11,000 charging locations, and imports station data directly from major EVSE networks nightly (AeroVironment, Blink, ChargePoint®, and SemaCharge). Mobile phone app is now available.

February 2015 Strategic Planning Meeting – Washington, DC

Purpose: To inform Clean Cities strategic development for the next 5 years with a focus on niche markets/opportunities for AFVs, ATVs, and petroleum reduction practices

Briefing Papers on Status in the U.S. for:

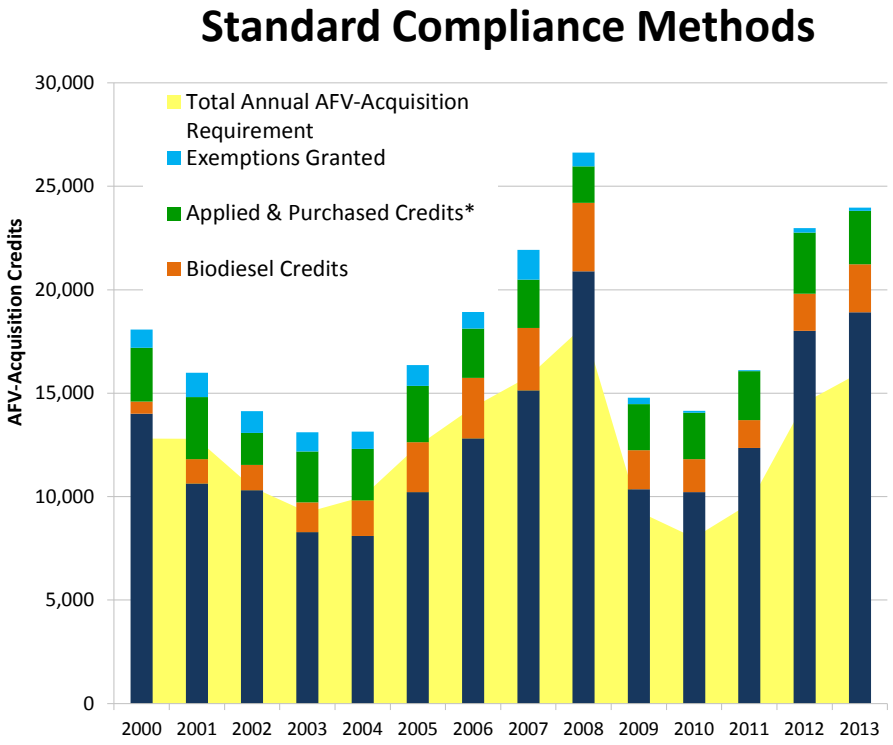
- Biodiesel
- Consumer Fuel Economy
- Ethanol
- Idling Reduction
- Natural Gas
- Plug-in Electric Vehicles and Hybrid Electric Vehicles
- Propane

Outcomes:

- Meeting report issued: spring 2015
- Draft strategic plan due: summer 2015
- Final strategic plan anticipated: fall 2015

State and Alternative Fuel Provider Fleet Regulatory Activities

- EPAct requires State fleets and Alternative Fuel Provider fleets to acquire AFVs, deploy fuels
- Implementing 2014 Final Rule providing credit for acquisitions of non-AFV electric drive vehicles, and investments in infrastructure, emerging technologies, etc.
- Management of legislative and regulatory activities for VTO, including designation of alternative fuels



Consistent 100% Program Compliance by Covered State and Alternative Fuel Provider Fleets

Training the Next Generation of Engineers

Provide a new generation of engineers with knowledge and skills in developing and commercializing advanced automotive technologies.

26 years of university-level advanced vehicle technology competitions!

Senator Albert Gore, Jr. (D-TN) congratulates Cameron Sumner of the University of Tennessee. Tennessee came in first place in the GM/SAE Methanol Marathon with a cumulative score of 764 points. The 1,100-mile, five-day rally came to a conclusion on Capitol Hill on May 4.

* * * *

General Motors Public Relations (202)775-5040

1988–1990 > Methanol Marathon

1990–1993 > Natural Gas Vehicle Challenge

1992–1995 > HEV Challenge

1995–1997 > Propane Vehicle Challenge

1995–1999 > FutureCar Challenge

1997–1999 > Ethanol Vehicle Challenge

1999–2004 > FutureTruck

2004–2008 > Challenge X: Crossover to Sustainable Mobility

2008–2011 > EcoCAR: The NeXt Challenge

2011–2014 > EcoCAR 2: Plugging In to the Future

Our Impact

- 93 North American universities have participated since 1989
- 531 individual university teams have competed
- More than 16,500 students have participated
- 83% of AVTC graduates have entered the automotive industry
- 69 patent applications submitted by AVTC graduates

President Obama visits the Ohio State University EcoCAR team

OEMs **suppliers** **Software Cos.**

academia **government**

EcoCAR 3

- 4 year competition (2014 – 2018)
- Based on a real-world vehicle design process
- Teams will be challenged to reduce the environmental impact of a GM-donated vehicle by minimizing the vehicle's fuel consumption and reducing its emissions
- Consider cost and explore innovation
- All while retaining the vehicle's performance, safety, and consumer appeal

The Chevrolet Camaro, donated by General Motors, is the integration platform for student advanced vehicle designs.

EcoCAR3

Advanced Vehicle Technology Competition

- DOE is teaming with General Motors and more than 30 other government and industry leaders..

16 North American Universities selected to participate.

Arizona State University
California State University – Los Angeles
Colorado State University
Embry-Riddle Aeronautical University
Georgia Institute of Technology
McMaster University
Mississippi State University
Ohio State University
Pennsylvania State University
University of Tennessee, Knoxville
University of Alabama
University of Washington
University of Waterloo
Virginia Tech
Wayne State University
West Virginia University

Training the Next Generation

Graduate Automotive Technology Education

- Receive DOE funding for student fellowships and curriculum development.
- Each center has established a graduate engineering education program that offers courses emphasizing that center's technology specialty.
- **In 2011, 7 GATE Centers awarded - $6.4 million (DOE) over 5 years**
- Focus on three critical automotive technology areas: hybrid propulsion, energy storage, and lightweight materials.

Seven Centers of Excellence Awarded in 2011

- The Ohio State University **- Energy Storage and Hybrid Propulsion**
- University of Michigan, Dearborn - **Hybrid Propulsion**
- University of Colorado, Colorado Springs (UCCS), and the University of Colorado, Boulder (CU-Boulder) - **Energy Storage and Hybrid Propulsion**
- Purdue University -**Hybrid Propulsion with emphasis on Medium/Heavy Duty**
- Clemson University - **Hybrid Propulsion**
- Pennsylvania State University - **Energy Storage**
- University of Alabama, Birmingham - **Lightweight Materials**

Summary

- Clean Cities focus continues to be on tools, resources, education and supporting local coalitions that can help bring new petroleum reduction projects to market
  - Biggest factor petroleum replacement is still AFVS
  - Strategic planning important to set goals and objectives for the program for the next 5 years; allows stakeholders to help drive the agenda
  - New tools, resources and technical support, and funding opportunities for communities and businesses
  - Lab related outreach, education, and technical assistance projects will be highlighted in the Tuesday sessions on Technology Integration
- State and Alternative Fuel Provider Fleet Rule
  - Continue to have a virtual 100% compliance rate
  - In 2014 successfully completed and Implemented rule clarifying credit for fleets for HEVs, PHEVs , NEVs and infrastructure and new technology investment.
- EcoCAR 3 Year 2 will focus on the integration of student designs into the platform vehicle. Vehicles will be evaluated by industry leaders at the Year 2 competition.

Contact Information

www.vehicles.energy.gov

Clean Cities
U. S. Department of Energy

Dennis Smith,
202-586-1791
dennis.a.smith@ee.doe.gov

Linda Bluestein,
202-586-6116
linda.bluestein@ee.doe.gov

Vehicle Education

Connie Bezanson,
202-586-2339
connie.bezanson@ee.doe.gov

Legislative & Rulemaking

Dana O'Hara,
202-586-8063
dana.o'hara@ee.doe.gov